FIG. 1

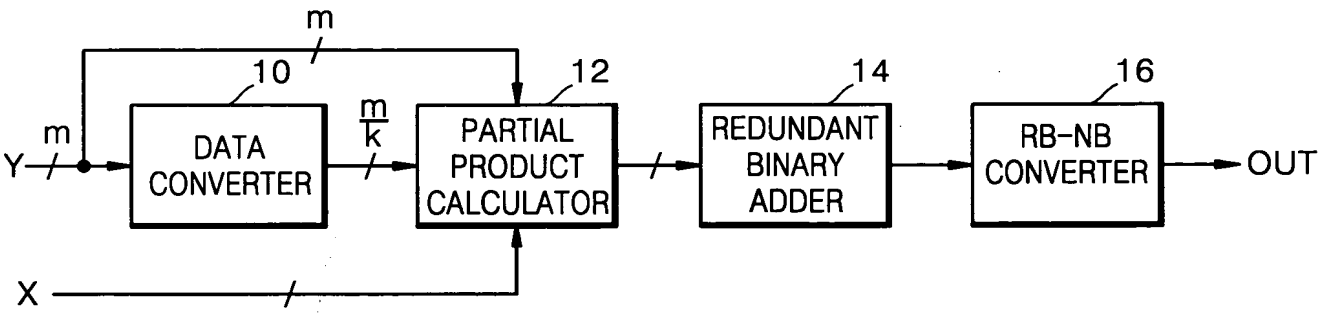
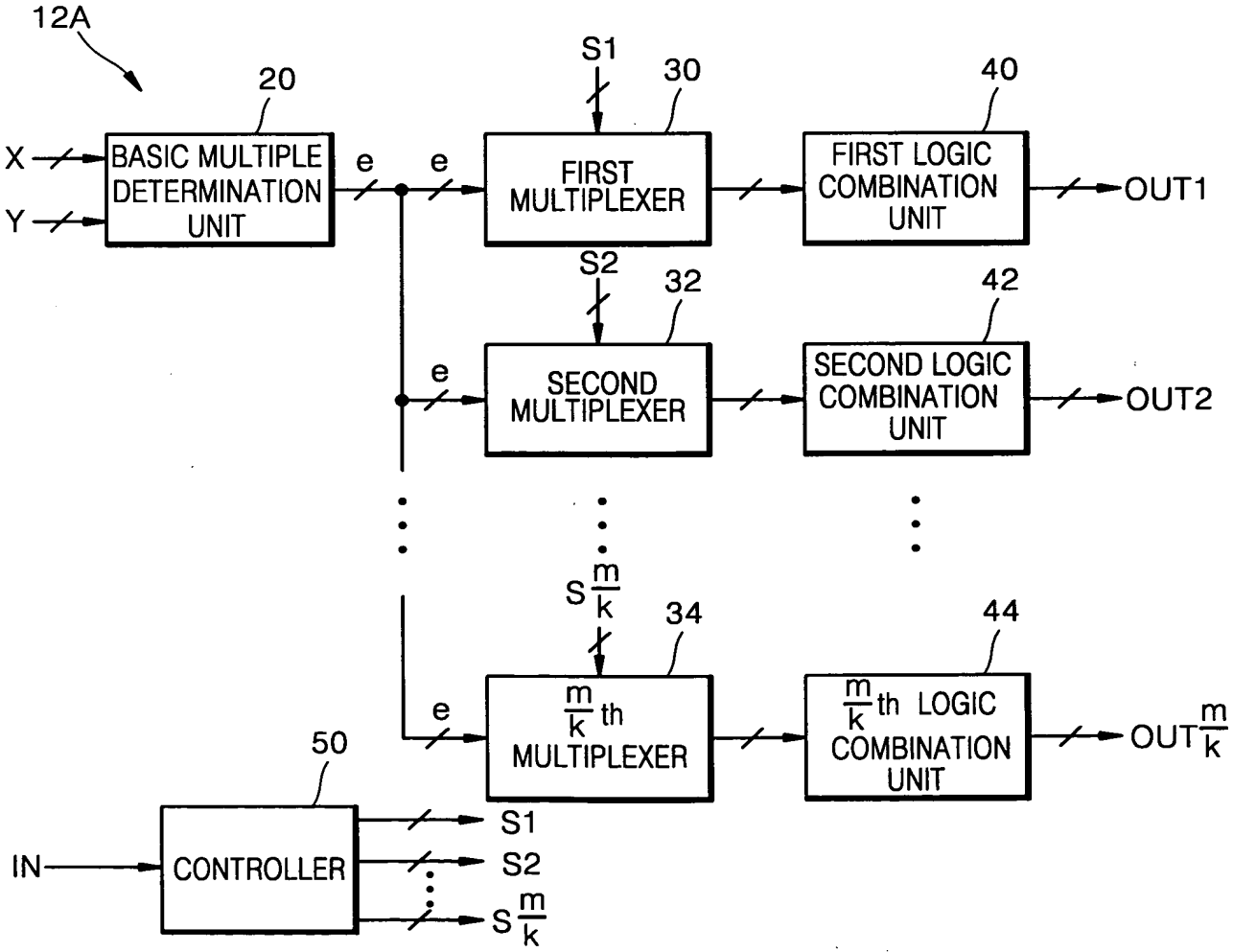

m
10
12
14
16
m
Y
DATA CONVERTER
m/k
PARTIAL PRODUCT CALCULATOR
REDUNDANT BINARY ADDER
RB-NB CONVERTER
OUT
X

FIG. 2


12A
20
S1
30
40
X
Y
BASIC MULTIPLE DETERMINATION UNIT
e
e
FIRST MULTIPLEXER
FIRST LOGIC COMBINATION UNIT
OUT1
S2
32
42
e
SECOND MULTIPLEXER
SECOND LOGIC COMBINATION UNIT
OUT2
S m/k
34
44
e
m/k th MULTIPLEXER
m/k th LOGIC COMBINATION UNIT
OUT m/k
50
IN
CONTROLLER
S1
S2
S m/k

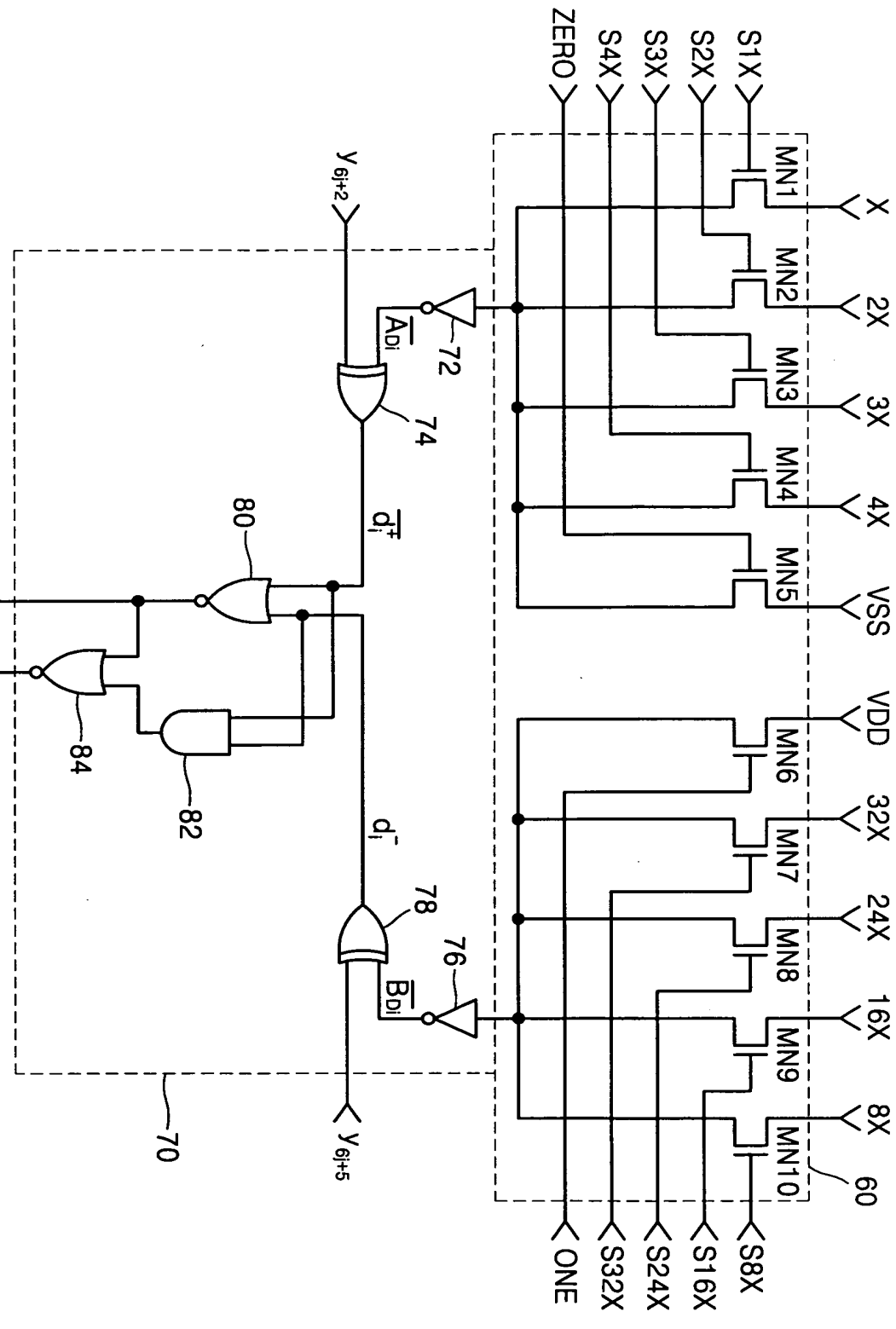

ZERO
S1X
S2X
S3X
S4X
MN1
MN2
MN3
MN4
MN5
X
2X
3X
4X
VSS
VDD
MN6
MN7
MN8
MN9
MN10
32X
24X
16X
8X
60
ONE
S32X
S24X
S16X
S8X
y_{6j+2}
$\overline{A_{Di}}$
72
74
$\overline{d_i^+}$
80
$d_i^+\overline{d_i^-}$
$\overline{(d_i^+ \oplus d_i^-)}$
84
82
d_i^-
78
76
$\overline{B_{Di}}$
70
y_{6j+5}

FIG. 3

FIG. 4

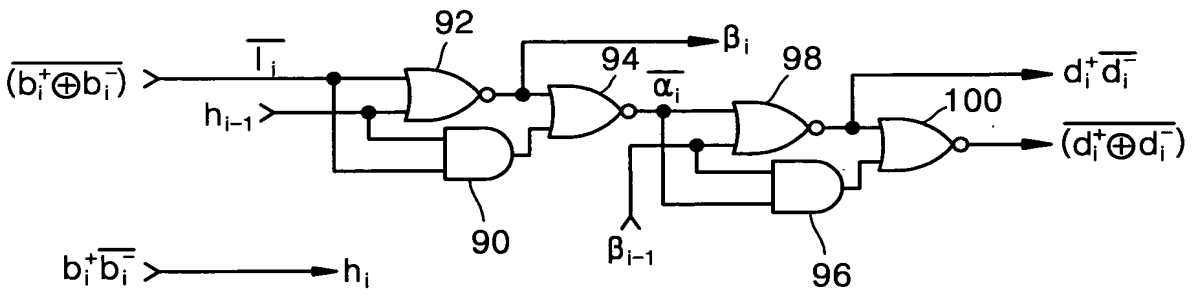

92
$\overline{l_i}$
β_i
94
98
$d_i^+\overline{d_i^-}$
$(\overline{b_i^+\oplus b_i^-})$
$\overline{\alpha_i}$
100
h_{i-1}
$(\overline{d_i^+\oplus d_i^-})$
90
β_{i-1}
96
$b_i^+\overline{b_i^-}$
h_i

FIG. 5

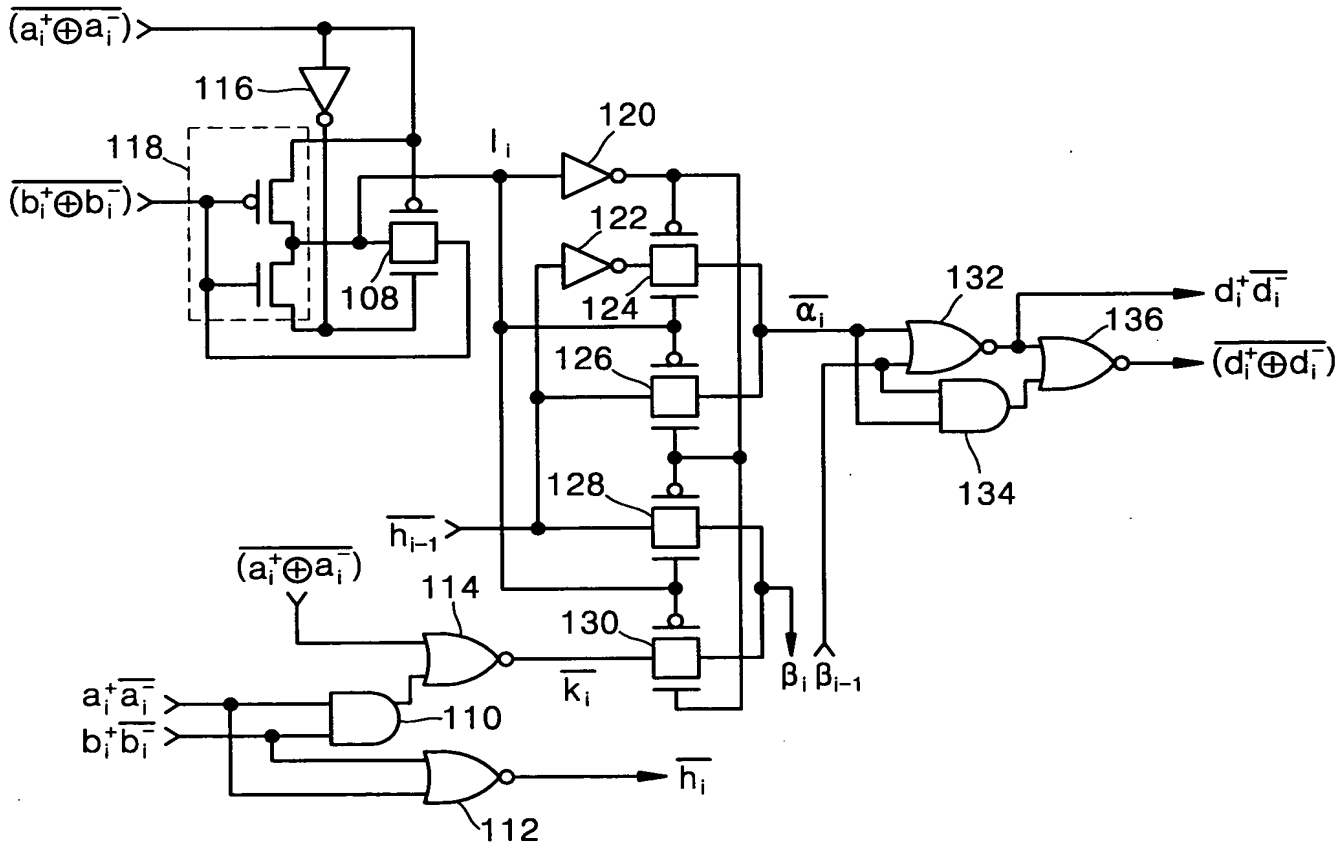

$(\overline{a_i^+\oplus a_i^-})$
116
120
118
l_i
$(\overline{b_i^+\oplus b_i^-})$
122
124
108
132
$d_i^+\overline{d_i^-}$
$\overline{\alpha_i}$
136
126
$(\overline{d_i^+\oplus d_i^-})$
128
134
$\overline{h_{i-1}}$
$(\overline{a_i^+\oplus a_i^-})$
114
130
β_i β_{i-1}
$\overline{k_i}$
$a_i^+\overline{a_i^-}$
110
$b_i^+\overline{b_i^-}$
$\overline{h_i}$
112

FIG. 6

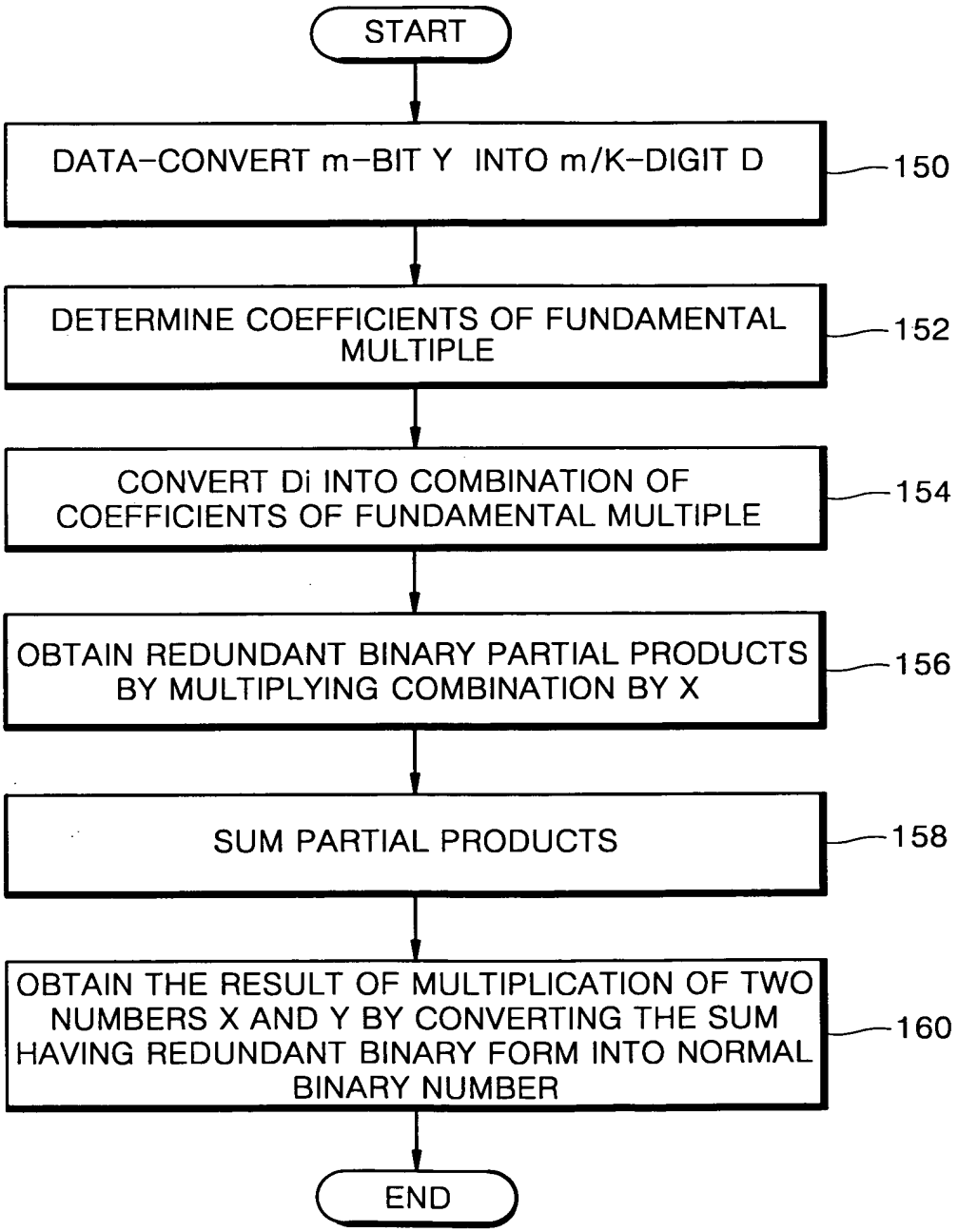

START
DATA-CONVERT m-BIT Y INTO m/K-DIGIT D
150
DETERMINE COEFFICIENTS OF FUNDAMENTAL MULTIPLE
152
CONVERT Di INTO COMBINATION OF COEFFICIENTS OF FUNDAMENTAL MULTIPLE
154
OBTAIN REDUNDANT BINARY PARTIAL PRODUCTS BY MULTIPLYING COMBINATION BY X
156
SUM PARTIAL PRODUCTS
158
OBTAIN THE RESULT OF MULTIPLICATION OF TWO NUMBERS X AND Y BY CONVERTING THE SUM HAVING REDUNDANT BINARY FORM INTO NORMAL BINARY NUMBER
160
END

FIG. 7

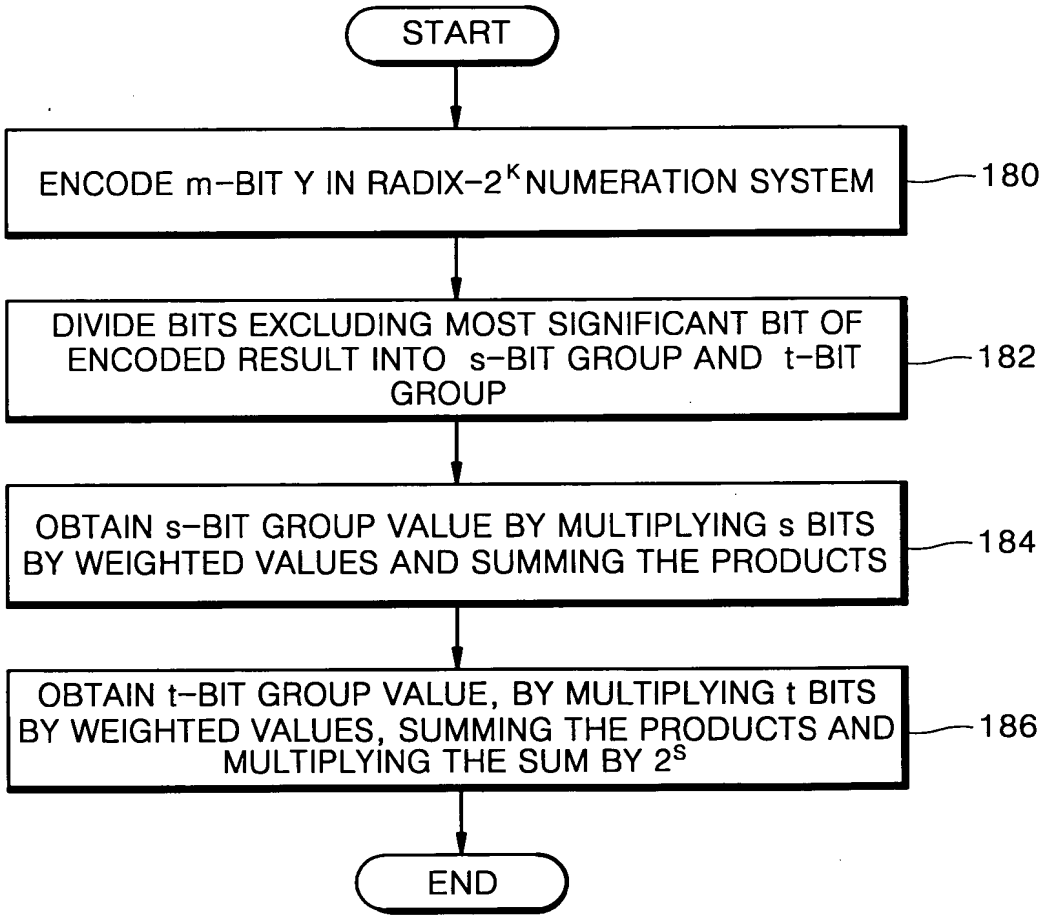

START
ENCODE m-BIT Y IN RADIX-2^K NUMERATION SYSTEM
180
DIVIDE BITS EXCLUDING MOST SIGNIFICANT BIT OF ENCODED RESULT INTO s-BIT GROUP AND t-BIT GROUP
182
OBTAIN s-BIT GROUP VALUE BY MULTIPLYING s BITS BY WEIGHTED VALUES AND SUMMING THE PRODUCTS
184
OBTAIN t-BIT GROUP VALUE, BY MULTIPLYING t BITS BY WEIGHTED VALUES, SUMMING THE PRODUCTS AND MULTIPLYING THE SUM BY 2^S
186
END

FIG. 8

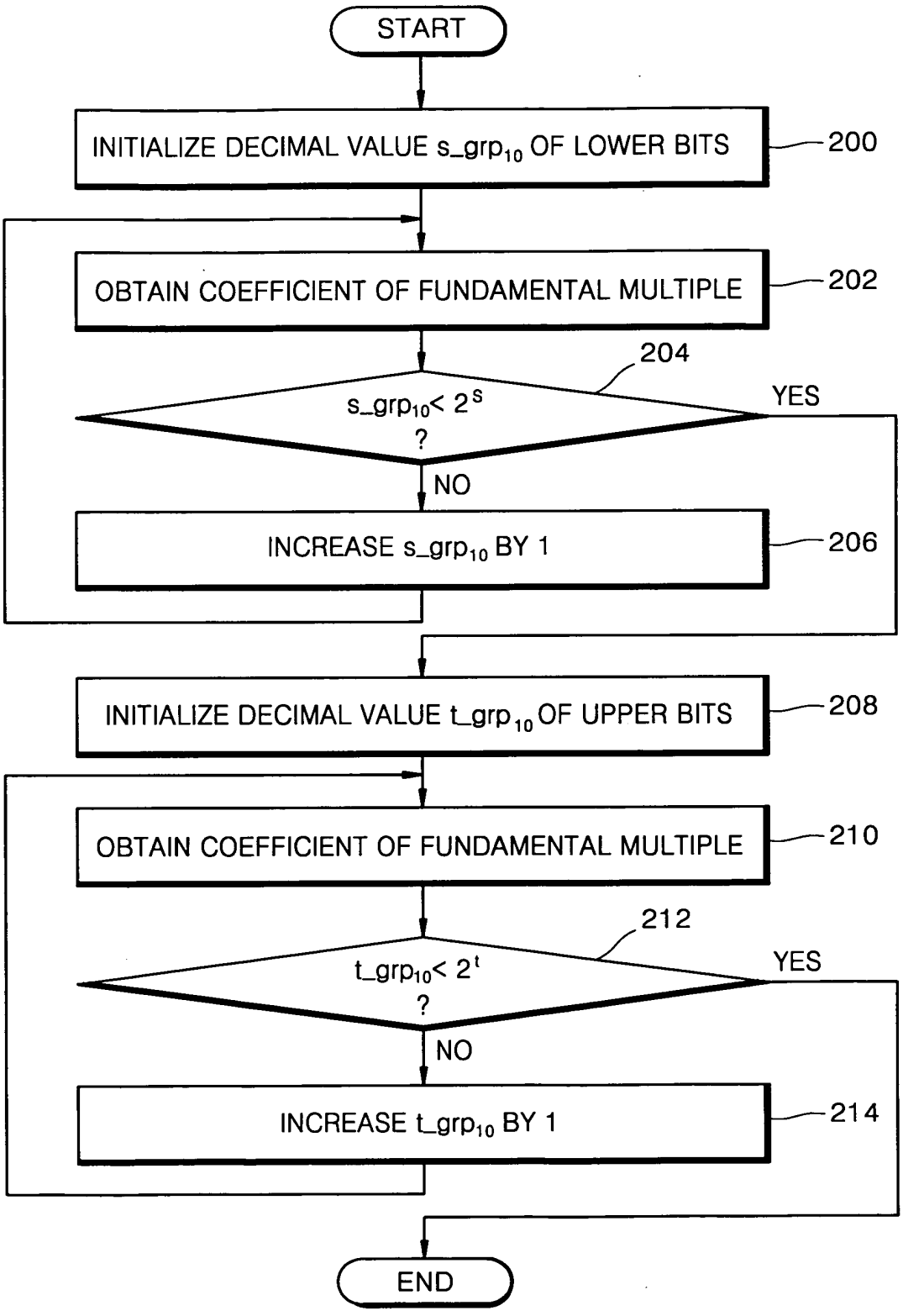
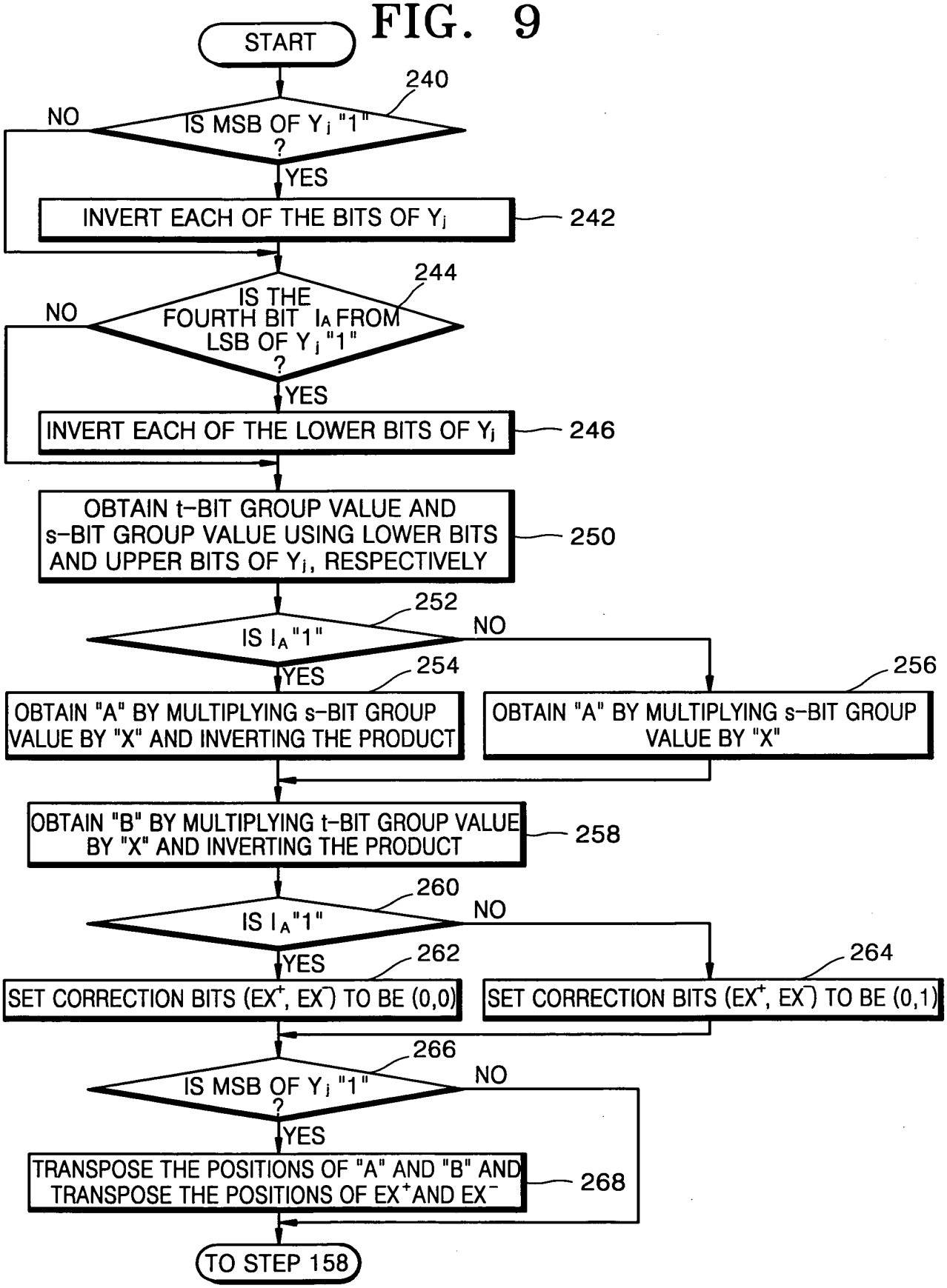

START
INITIALIZE DECIMAL VALUE s_grp10 OF LOWER BITS
200
OBTAIN COEFFICIENT OF FUNDAMENTAL MULTIPLE
202
204
s_grp10< 2^s ?
YES
NO
INCREASE s_grp10 BY 1
206
INITIALIZE DECIMAL VALUE t_grp10 OF UPPER BITS
208
OBTAIN COEFFICIENT OF FUNDAMENTAL MULTIPLE
210
212
t_grp10< 2^t ?
YES
NO
INCREASE t_grp10 BY 1
214
END

FIG. 9


START
240
IS MSB OF Y_j "1" ?
NO
YES
INVERT EACH OF THE BITS OF Y_j
242
244
IS THE FOURTH BIT I_A FROM LSB OF Y_j "1" ?
NO
YES
INVERT EACH OF THE LOWER BITS OF Y_j
246
OBTAIN t-BIT GROUP VALUE AND s-BIT GROUP VALUE USING LOWER BITS AND UPPER BITS OF Y_j, RESPECTIVELY
250
252
IS I_A "1"
NO
YES
254
OBTAIN "A" BY MULTIPLYING s-BIT GROUP VALUE BY "X" AND INVERTING THE PRODUCT
256
OBTAIN "A" BY MULTIPLYING s-BIT GROUP VALUE BY "X"
OBTAIN "B" BY MULTIPLYING t-BIT GROUP VALUE BY "X" AND INVERTING THE PRODUCT
258
260
IS I_A "1"
NO
YES
262
SET CORRECTION BITS (EX^+, EX^-) TO BE (0,0)
264
SET CORRECTION BITS (EX^+, EX^-) TO BE (0,1)
266
IS MSB OF Y_j "1" ?
NO
YES
TRANSPOSE THE POSITIONS OF "A" AND "B" AND TRANSPOSE THE POSITIONS OF EX^+ AND EX^-
268
TO STEP 158